ASDP Pre-Application Project and Drainage Narrative

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Project: Hyla Crossing Pumped Stormwater Discharge

KPFF Job No. 1800530

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TABLE OF CONTENTS

I. INTRODUCTION

Hyla Crossing is a collection of developed parcels located in the valley south of I-90 bounded by Tibbetts Creek and SR-900. Currently, the stormwater runoff from the site discharges to Tibbetts Creek with no engineered flow control. In order to redevelop Hyla Crossing, a designated urban village, flow control must be provided per the 2009 KCSWDM.

Traditionally, flow control is provided via open ponds or underground vaults. When open ponds were considered, the desired densification of the parcels could not be achieved since much of the surface area needed to be reserved for ponds. Each of these ponds would require individual smaller pump stations to lift the stormwater up to the shallow Tibbetts Creek ordinary high water elevation. Additionally, waterproof liners would be needed prevent the shallow groundwater from filling the ponds.

Buried vaults present a similar challenge to the development. As Hyla Crossing is developed, buried vaults would be installed under parking areas or incorporated into building basements. These vaults would be subject to groundwater uplift requiring substantial footings and anchors to prevent heaving. Since these vaults would be buried, individual pump stations would similarly be required.

With the detention storage and associated individual pump stations spread out over Hyla Crossing there is an increased risk of flooding during a power outage or high intensity storm. Additionally, the power consumption, standby fuel storage and use, and equipment maintenance and replacement represent a larger environmental footprint.

The proposed pump station is a regional facility that replaces the need for inefficient individual detention systems and associated pump stations. This solution allows the densification and urban infill of Hyla Crossing making the best use of the property and limiting sprawl to the nearby undeveloped areas. The risk of flooding is also reduced by providing a singular system at the downstream end of the basin where high flows are managed and released safely to Tibbetts Creek.

This concept is described in the Rowley Developer Agreement and the Hyla Crossing Master Drainage Plan. It is unique as it will meet flow control requirements by pumping excess stormwater to a near shore outfall on Lake Sammamish. The proposed pump station will receive stormwater runoff from 42.9 acres of Hyla Crossing and divide it appropriately between Tibbetts Creek and Lake Sammamish. The flow to Lake Sammamish will be pumped across Interstate 90 (I-90) through a high density polyethylene (HDPE) force main as described in the project's Mitigated Determination of Non-Significance (#SEP11-00005). The I-90 crossing will be installed using trenchless construction methods.

As described in the Master Drainage Plan, this project will eventually be turned over to the City of Issaquah as a publically owned, operated, and maintained facility. To that end, the design team and the City of Issaquah are working together to develop a design that meets the form and function required by the City while blending into the architecture of the greater Hyla Crossing.

Additional information regarding the project design concept can be found in the report titled, "Hyla Crossing Pumped Stormwater Discharge Preliminary Technical Information Report," issued by KPFF Consulting Engineers dated December 2018.

II. PUMP STATION

Location

The pump station will be located at the intersection of Northwest Poplar Way and 19th Avenue Northwest as depicted in the preliminary site plan. Vehicular access will be provided from a 12-foot-wide driveway off of Northwest Poplar Way and an access door large enough to allow a forklift to enter the building.

This building location was selected because it is at the low end of the Hyla Crossing development, allowing stormwater from the entire area to gravity flow to the pump station intake. The location is also near an existing road for ease of vehicular access while remaining outside of the Tibbetts Creek buffer enhancement zone.

The provided intersection study of Northwest Poplar Way and 19th Avenue Northwest shows the future roadway easement lines as defined by the roadway sections in the Rowley Master Developer Agreement (Rowley DA). These lines, along with the Tibbetts Creek North Enhancement Area, effectively define the site area. Per the Rowley DA, a 15-foot building setback is required from the enhancement area and no setback is required from roadways other than for roadway safety. As shown in the intersection study, the building is located outside of 19th Avenue Northwest's clear sight triangle. The building location shown in the preliminary site plan is also compatible with the existing alignment of Northwest Poplar Way and 19th Avenue Northwest.

Building

The pump station will be a simple structure with a footprint of approximately 30 feet by 30 feet. These types of buildings are commonly built with concrete masonry units (CMU) for cost efficiency and long-term durability. The building roof will be pitched as requested by the City of Issaquah operations group. Final design will be reviewed and approved by the Rowley Architectural Review Committee.

The building foundation will be below the groundwater table and will be designed with an anti-float base extension and/or a thickened mat slab. The depth of the pump station sump pits is defined by the depth of the upstream conveyance from Hyla Crossing. The excavation for these deep footings will require temporary dewatering and shoring.

The pump station is laid out with the main level at grade and submersible pump chambers below grade. The pump motor variable frequency drives (VFDs), electrical panels, pump discharge gate valves and check valves are all above grade to allow for convenient access for maintenance and inspection without requiring entry into a confined space or the use of fall protection. Open floor space at grade is provided for use as a pump maintenance area so work can occur inside the building. The electrical room is physically separated from the rest of the pump station by a full height wall to provide a clean and dry space for the electrical equipment.

Pumps

The four submersible pumps are housed in two separate chambers. One chamber contains two pumps that discharge to Lake Sammamish and the other chamber contains two pumps that discharge to Tibbetts Creek. Only one of each pump will be required to operate at a time firing in an alternating duplex sequence. This redundancy allows one of each pump to be taken out of service for maintenance or repairs without posing a flood risk to nearby areas. The pumps will be lifted in and out of the chambers through access hatches in the floor. Personnel access hatches with permanent ladders will be provided for each of the pump chambers.

Heavy pump lifts will be performed using a motor operated chain hoist installed on an overhead beam inside the pump station. The chain hoist will attach to the beam with rollers to allow vertical and horizontal movement. The hoist beam will be located directly above the submersible pumps. Each pump will have a guide rail to facilitate raising and lowering the pumps into the correct alignment such that no personnel will be required to be in the pump chamber during the heavy lift.

Hydraulics

The amount of flow directed to Tibbetts Creek versus Lake Sammamish is in accordance with Level 2 Flow Control as defined in the 2011 City of Issaquah Addendum to the 2009 King County Surface Water Design Manual. The pump station will split the flow using a flow splitter wall which contains two metal plates with orifices and/or weirs. The elevation and size of the orifices and weirs will be designed to allow the appropriate amount of stormwater to flow to each pump chamber.

Hyla Crossing will be redeveloped in multiple phases, so the amount and the rate of stormwater directed to the pump station will change until the redevelopment phases are complete. This requires the orifice and weir configurations in the metal plates to be changed with development phases to maintain compliance with stormwater regulations. Thus, the flow splitter wall metal plates are removable to allow for different orifice and weir configurations. Future Rowley construction projects will modify the removable metal plates such that the appropriate amounts of stormwater are sent to Tibbetts Creek and Lake Sammamish throughout the different phases of redevelopment. Access for plate removal and attachment will be provided through hatches in the floor. Personnel access to the removable plates will be provided through the pump personnel access hatches described above.

Currently, most of the stormwater runoff from Hyla Crossing is piped to a WSDOT-owned ditch that runs parallel to I-90, then immediately outfalls to Tibbetts Creek. It is important to note that the pump station maintains this discharge location to the I-90 ditch for both Tibbetts Creek base flows and overflows. Base flows and overflows will discharge via gravity to a new outfall located just upslope of the WSDOT I-90 eastbound ditch on Rowley property. This new outfall will eventually replace the existing outfall to the I-90 ditch. The base flows will be pumped to the gravity discharge pipe while overflows gravity flow from the pump station to the outfall. The pump station discharge to Lake Sammamish will flow through a forcemain pipe that will run under I-90 and through the City of Issaquah Greenwood Trust Wetland. Both the I-90 crossing and ditch outfall are currently being coordinated with WSDOT.

Power and Equipment Alarms

Normal operational power for the pump station will come from the existing overhead power lines in the area. Backup power will be provided by a diesel-fired generator in a well-screened prefabricated housing separate from the pump station building. The backup generator housing will have sound dampening provided to manage any noise impact to the surrounding area while the generator operates.

The building will also be provided with a telemetry system that will send an alert if any equipment alarms are received (high/low water levels, pump malfunction, fire, etc.). Further coordination with the City of Issaquah is needed to define these requirements.

III. LAKE SAMMAMISH NEAR SHORE OUTFALL

The Lake Sammamish outfall will be situated 10 feet upslope of the ordinary high water line as recommended by the stakeholders at the February 27, 2019 Army Corps of Engineers Joint Agency Pre-Application meeting. This outfall option is significantly less environmentally impactful than the submerged lake outfall described in the State Environmental Policy Act Mitigated Determination of Non-Significance (SEPA MDNS) while still maintaining its intent. Unlike the submerged outfall, the near shore outfall does not require dewatering cofferdams, in-water trenching, or disturbing lake bed sediment. Access to the outfall will be provided via barked trail to minimize the impact to the Greenwood Trust Wetland.

Upstream of the outfall, the 24 inch HDPE pipe will start to daylight to grade at a 0.10% minimum slope then transition to a restrained joint ductile iron pipe when the cover falls below 2 feet. Ductile iron pipe will be used because it does not expand or contract significantly with temperature, can withstand large surface loads, and is not affected by ultraviolet radiation. An in-line elastomeric check valve at the outfall will prevent wildlife, debris, and lake water, from entering the outfall. Immediately downslope of the pipe outfall will be a gabion basket energy dissipater followed by a rock pad to the ordinary high water line. There will be no work downslope of the ordinary high water line. Access to the outfall will be provided by a barked trail directly above the pipe.

IV. ANTICIPATED REGULAR MAINTENANCE

As described in the Master Drainage Plan, the pump station and outfall pipe will eventually be turned over to the City of Issaquah and become publically owned, operated, and maintained.

Pump Station

There is minimum sediment and trash loading anticipated at the pump station because all tributary flow will have received runoff quality treatment; however, the pump chambers and sumps may still require periodic trash, debris, and sediment removal. Regular inspection of the facility during the initial months of operation should be performed in order to determine the long term inspection schedule.

A vactor truck would be required to remove any accumulated sediment. Pump chambers may require dewatering prior to maintenance, and the effluent from dewatering should be discharged to the nearby sanitary sewer system according to local regulations. The orifice and/or weir openings in the removable metal plates will need to be inspected for debris blockage and cleared if blocked. A vactor truck will have access to the below-grade sumps while parked in the driveway adjacent to the pump station.

Equipment maintenance should be performed in accordance with the manufacturer recommendations. Electrical equipment such as float switches, VFDs, and panels should be visually inspected to check for wear and tear.

Valves should be inspected at the manufacturer's recommended frequency, or at least semi-annually. Valves should be visually inspected to check for any leakage at joints or packing. Check valves should be observed while pumps are running to ensure the discs are seating. Check valve disc position can be observed externally from the spring lever. Gate valves should be exercised to confirm they are fully seating and not sticking.

The following is an example of a manufacturer's recommended pump maintenance for a submersible pump of the size and type suitable for this project:

> *Pump maintenance is anticipated to include monthly runs of idle pumps; quarterly inspections of lifting chains and cables; semi-annual checks of motor amp draw, semi-annual pump wash down; and annual checks of pump seal water/glycol mixture. The seal water/glycol mixture should only need to be replaced if it is contaminated. The bearings, impeller and wear rings should not require regular maintenance and should only require maintenance if performance has decreased.*

The following is an example of a manufacturer's recommended diesel generator maintenance.

	Weekly	Monthly	Bi-Annual	Annual
Run generator with no load	X			
While generator is running, make sure it has no alarm or warning signals	X			
Double check fuel levels	X			
Make sure generator is turned to "auto" mode	X			
Circuit breaker should be closed	X			
Check for any fluid leaks	X			
Check the level of engine coolant		X		
Check the level of engine oil		X		
Check battery charger		X		
Inspection of the enclosure			X	
Check battery electrolyte level and specific gravity			X	
Inspection of drive belts			X	
Inspection of coolant heater			X	
Inspection of battery cables and connections			X	
Inspection of coolant lines and connections			X	
Inspection of any oil leaks, lubrication system hoses, connectors			X	
Inspection of the exhaust system, muffler, exhaust pipe			X	
Check for any fuel leaks; inspection of fuel system hoses, connectors			X	
Clean air cleaner units			X	
Inspection of air induction connections and piping			X	
Inspection of DC electrical system, control panel, accessories			X	
Inspection of AC wiring, accessories			X	
Change: oil and filter, fuel filter, air filter, spark plugs				X
Clean crankcase breather				X
Check coolant concentration				X
Flush cooling system as needed				X
Perform annual load bank testing				X
Fuel testing and reconditioning				X
Remove any water from fuel tank				X

Lake Sammamish Near Shore Outfall

The near shore outfall will be designed as a robust system that only requires minimal maintenance. Visual inspection of the outfall and in-line check valve should be made once monthly during the rainy season and additionally after heavy rain. Overgrowth around the outfall should be cleared every 6-months with hand operated trimmers. The access trail edges should be mowed once monthly during the spring and fall growing seasons and re-barked once yearly to manage vegetation overgrowth.